IV. REMARKS

Amendments to the Specification:

Pursuant to the current amendment format guidelines, replacement paragraphs for the specification are presented, with revision markings to show changes from the immediately prior version thereof.

Changes to the specification are for correction of typographical errors. The changes to the specification do not introduce new matter into the application.

Amendments to the Claims:

Pursuant to the current amendment format guidelines, a complete listing all claims presented in the application, with current claim status, is listed above, along with the text of all claims currently under examination, and with revision markings to show current changes to currently amended claims as revised from the immediately prior version thereof. Amendments to the claims do not introduce new matter into the application.

Claim Rejection under 35 USC § 103

Claims 1-3 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wolf (US Patent No. 5,818,223).

Allowable Subject Matter

Claims 4-8 were objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Claims 9-21 were allowed in the Office Action.

Applicants thank the examiner for allowance of claims 9-21, and indication that claims 4-8 would be allowable if rewritten in independent form.

Summary of Amendments to the Claims

As discussed in detail below, claim 1 has been amended for clarification of differences with the Wolf angular sensor unit. Independent claims 9 and 21 have been amended for consistency with the amendment to claim 1. Amendments to dependent claims 2, 4-5, 7-8 and 19 are for consistency with the amended claims from which they depend, for additional clarification of differences with the prior art, for ease of reading, and/or for correction of typographical errors. New independent claim 22 was added as further definition of the invention to which applicants believe they are entitled.

Response to Rejection - Request for Reconsideration

Applicants request reconsideration of the rejection of claims 1-3. Applicants have carefully reviewed the Wolf patent, and do not believe it discloses the claimed subject matter.

The present invention provides for, among other things, an angular sensor with an annular magnet that has been magnetized with an iron core in its center. As discussed further on pages 7, and 16-18 of the Specification, and shown in FIGS. 3, 4 and 5a-b, magnetizing an annular magnet with an iron core permanently reshapes the flux density characteristic of the magnet as compared with the flux density characteristic of a conventionally magnetized annular magnet (magnetized without an iron core through its center). In particular, magnetizing the annular magnet with the iron core reshapes the flux density characteristic of the magnet towards the flux density characteristic of the iron core, resulting in permanently enhanced linearity flux density characteristics of the annular magnet. The iron core is not part of the completed sensor, but is used during magnetization of the annular magnet to obtain enhanced linearity of the magnetic flux density of the magnet as it rotates about its center axis.

In contrast, Wolf utilizes flux concentrators assembled into the angular sensor to obtain a sensor element output signal with enhanced linearity as compared to what the sensor element output signal would be without the flux concentrators. (See e.g., Wolf, Col. 5, Lines 25-52, FIG. 7). The annular magnet in the Wolf sensor is a conventional magnet, and provides conventional annular magnet flux density characteristics. (Col. 5, Lines 37-41, "line 72" in FIG. 7). The flux concentrators affect the flux density characteristic as sensed by the sensor element, they do not affect the flux density characteristic of the magnet itself. But for the flux concentrators assembled into the unit to reshape the flux density characteristic sensed by the sensor element, the Wolf angular sensor would not exhibit enhanced linearity characteristics. Wolf does not teach, discuss or suggest anything with regard to magnetizing of the annular magnet. Instead, it teaches an arrangement that compensates for the otherwise non-linear characteristics of the magnet in the completed sensor.

Consequently, Wolf lacks an essential element of claim 1. Wolf does not anticipate or contemplate use of an annular magnet that has been magnetized with an iron core to obtain enhanced linearity of flux density characteristics of the magnet.

To clarify the differences between the invention as presented in claim 1, and the Wolf arrangement, claim 1 has been amended to read, in pertinent part: "the annular magnet having been magnetized according a method comprising inserting an iron core through its inside diameter during magnetization thereof to obtain enhanced linearity of magnetic flux density as the magnet rotates about its center axis."

Claim 2 recites, among other things, the annular magnet and sensor element of claim 1 being located around the shaft. In addition to the considerations with regard to claim 1 discussed above, Wolf does not disclose or suggest positioning the annular magnet around the shaft or

positioning the sensing element outwardly of the magnet as now clarified in amended claim 2. Instead, Wolf positions the annular magnet inside a sleeve on the shaft and positions the sensing element inside the annular magnet (FIGS 16-17). In particular, Wolf positions the sensing element (204) sandwiched between L-shaped flux concentrators (206) and below the axially adjustable annular flux concentrator (208). This positioning is important to the performance of the flux concentrators, and there is no suggestion in Wolf that positioning the sensing element and L-shaped flux concentrators outside the magnet would result in a operative unit. As a result, positioning the sensor element outside the annular magnet as recited in claim 2 is not equivalent to or obvious in view of the Wolf arrangement.

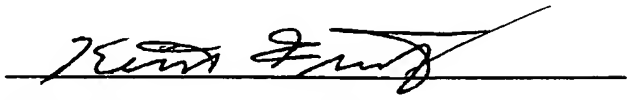
As will be seen by comparison of FIG. 16 of Wolf, and FIG. 1 of the present Application, the difference in sensor element positioning and basic operations results in two quite different sensor units. Positioning the sensing element inside the annular magnet in Wolf results in a relatively complicated sensor unit, with a sleeve to hold the sensing element inside a sleeve to hold the magnet, inside a sleeve to seal the top of the unit. In contrast, positioning the sensor element outside the annular magnet as taught in the present invention results in a simple arrangement, with a substantially reduced number of parts of much simpler configuration.

Claim 3 recites, among other things, the sensor of claim 1 with a second sensor element spaced 180 degrees from the first sensor element. In addition to the considerations with regard to claim 1 discussed above, Wolf does not provide for a second sensing element spaced 180 degrees from the first sensing element (204).

For the foregoing reasons, Applicants believe that Wolf does not anticipate claims 1-3 as originally presented or as amended herein. Therefore, Applicants respectfully request

reconsideration and withdrawal of the rejection of claims 1-3, as clarified by amendment herein, and allowance of all claims pending in the application.

Respectfully submitted,



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